An Account of some Experiments on different Combinations of Fluoric Acid. By John Davy, *Esq. Communicated by Sir* Humphry Davy, *Knt. LL.D. Sec. R.S.* Read June 11, 1812. [*Phil. Trans.* 1812, *p.* 352.]

The subject of this communication is divided into four sections, the first of which relates to silicated fluoric acid gas, and to subsilicated fluoric acid; the second to the combinations of these acids, and of pure fluoric acid with ammonia; the third relates to fluoboracic acid; and the fourth to the compound of this acid with ammonia.

For obtaining silicated fluoric gas, the author mixes finely-powdered glass with the materials which, at the same time that it increases the product, saves the retort from the action of the acid. In order to discover the proportion of its constituent parts, the gas was transferred to a solution of ammonia, which gave a precipitate of 27·2 grains silica from 40 cubic inches of the gas, amounting to 61·4 per cent., the rest being mere fluoric acid. When this gas is united to water, it deposits a portion of its silica, but still retains more than 54 per cent.

By an experiment conducted with care, water was found to decompose about 263 times its bulk of this gas; but by subsequent trials it appeared capable of absorbing as much as 365 times its volume.

Though this gas, in combining with ammoniacal gas, requires twice its bulk for saturation, the proportion of their densities is such, that the acid exceeds the ammonia in weight more than 3 to 1.

In combining with dry ammonia, it retains the whole of its silica, and the compound may be sublimed unaltered; but when it is dissolved in water, it loses a part of its silica, and will deposit the whole by excess of ammonia, or by addition of other alkaline solutions. This subsilicated fluate of ammonia is likewise decomposed by sulphuric acid or by muriatic acid gas.

When the subsilicated fluate has been decomposed by an excess of ammonia, and evaporated in a vessel of platina, a simple fluate of ammonia is obtained; and it is estimated to consist of 76·4 ammonia, and 23·6 fluoric acid.

For the formation of fluoboracic acid gas, discovered by MM. Gay-Lussac and Thenard, Mr. Davy mixes powdered boracic acid, instead of powdered glass, with fluor spar and sulphuric acid: 100 cubic inches of this gas were found to weigh $73\frac{1}{2}$ grains. Water condenses 700 times its bulk of this gas. Sulphuric acid absorbs about 50 times its bulk.

Equal volumes of this gas, and of ammoniacal gas, form a solid salt, that may be sublimed unaltered by a gentle heat. If another equal volume of ammonia be added, the whole becomes fluid, and will absorb still another equal portion of ammonia without apparent change. The excess of ammonia, however, is but loosely combined, and may be expelled by a gentle heat, or by simple exposure to the air.